5.6.6 UR6 - SOUTH COAST

The South Coast Region lies south of the Tehachapi Mountains and extends to the California border with Mexico. It is home for more than 50% of the state's population but represents only 7% of the state's total land area. Rivers and streams that originate in this region flow to the Pacific Ocean. The climate is Mediterranean-like, with warm and dry summers followed by mild and wet winters. It is projected that the region will increase from a 1990 population of 16 million to over 25 million by 2020. In sharp contrast to all the other regions, this region's urban demand accounts for 80% of the total demand. The region also imports about two-thirds of its water from areas outside the region, including the Colorado River, the Owens Valley, and the Bay-Delta.

The region is characterized by single- and multi-family dwellings with smaller landscapes, large amounts of industry, and many commercial businesses. The commercial and industrial water demands can be significant, accounting for over one-quarter of the total urban demand. This region also has the highest population density, with nearly 1,600 people per square mile of land.

Unlike the Central Valley regions, downstream reuse of landscape runoff and treated wastewater is limited to inland reaches of the region. Coastal communities have little downstream reuse. The majority of unconsumed urban water (water passing through wastewater treatment plants) is directly discharged to the Pacific Ocean, resulting in little opportunity for incidental reuse. For this reason, there is an increasing interest in capturing the discharges and recycling them back into the region. However, conservation measures also can help reduce the irrecoverable losses to these salt sinks. Any decrease in water use in this region, whether previously consumed or not, can generate real water savings.

In this region, 89 urban agencies have signed the Urban MOU.

URBAN INFORMATION
South Coast Region

	Population	*Baseline per-capita water use*
1995:	17.3 million	208 gpcd
2020:	24.3 million	186 gpcd (218 if no conservation occurs)

Approximate CII use in 1995:	32% of per-capita use
Estimated CII use in 2020:	32% of per-capita use
Assumed CII reduction as a result of conservation measures:	
No Action Alternative:	4% (of 2020 projected per-capita water use)
CALFED:	7%
Assumed residential indoor use (average):	
2020 baseline	65 gpcd
2020 No Action Alternative	60 gpcd
2020 CALFED	55 gpcd
Assumed distribution system losses (as a percent of total urban use):	
Existing:	7%
No Action Alternative:	6%
CALFED:	5%
Assumed ratio of irrecoverable losses to total existing loss:	0.8 (80%)
Assumed existing urban landscape acreage:	480,000 acres
Assumed urban landscaped acreage in 2020:	650,000 acres
Assumed ET_o Value:	4.0 feet of water annually

Estimated Reduction in Irrecoverable Losses for Reallocation to Other Water Supply Uses

Most of the conservation potential in the South Coast Region would constitute a water savings that could be made available to other beneficial uses, including offsetting future urban demands. Such savings would also provide other benefits, namely improved water quality, changed timing of flow releases, reduced fishery impacts, reduced treatment costs, and potentially reduced need for additional water supply development.

Table 5-12a. Assumed Distribution of Landscaped Acreage among ET_o Factors for the South Coast Region (%)

ET_o FACTOR	1995 ACRES (%)	BASE ACRES (%)	2020 NO ACTION EXISTING ACRES (%)	2020 NO ACTION NEW ACRES (%)	2020 CALFED EXISTING ACRES (%)	2020 CALFED NEW ACRES (%)
1.2	10	10	5	0	0	0
1.0	40	40	30	20	15	5
0.8	40	40	50	60	60	55
0.6	10	10	13	15	20	30
0.4			2	5	5	10

Table 5-12b. Potential Conservation of Existing Losses (Including Irrecoverable Loss) for the South Coast Region (TAF/Year)

USE	PROJECTED REDUCTION UNDER NO ACTION ALTERNATIVE	INCREMENTAL REDUCTION UNDER CALFED	TOTAL ESTIMATED REDUCTION
Residential indoor[1]	130-140	130-140	260-280
Urban landscaping[1]	170-190	190-200	360-390
Commercial, industrial, institutional[1]	60-70	110-120	170-190
Distribution system1	50-60	50-60	100-120
Total	**410-460**	**480-520**	**890-980**

[1] For this region, it is assumed that 20% of all losses are recovered and available to the local water supply.

Table 5-12c. Potential Conservation of Irrecoverable Losses (Available for Reallocation) for the South Coast Region (TAF/Year)

USE	PROJECTED REDUCTION UNDER NO ACTION ALTERNATIVE	INCREMENTAL REDUCTION UNDER CALFED	TOTAL ESTIMATED REDUCTION
Residential indoor[1]	100-115	100-115	200-230
Urban landscaping[1,2]	150-160	170-180	320-340
Commercial, industrial, institutional [1]	50-60	90-100	140-160
Distribution system[1]	40-50	40-50	80-100
Total	**340-385**	**400-445**	**740-830**

[1] For this region, it is assumed that 80% of all loss reduction is available for reallocation.

[2] Urban landscaping values include both reduction in losses and changes to landscaping types. See Attachment B for more details on landscape conservation estimates.

5.6.7 UR7 - COLORADO RIVER

The Colorado River Region includes a large area of the state's southeastern corner, the majority of which is desert or irrigated agriculture. The primary urban areas lie north and south of the Salton Sea. The resort-oriented communities of Palm Springs and Indio lie to the north, while the rural communities of Imperial and Brawley lie to the south. This area includes about 650,000 acres of irrigated agricultural land. The Salton Sea, located between the two urban areas, is a prominent feature. The sea is currently fed by rainfall from the surrounding desert mountains and by agricultural surface drainage. Rainfall in the mountains also recharges the groundwater aquifers that underlie the region. Groundwater plays a major role in providing for the urban demands, including the significant acreage devoted to golf courses. Urban water use comprises only about 5% of the region's total water use (agriculture uses 83%).

The region's climate is hot subtropical desert, with most of the annual precipitation falling as snow in the surrounding high mountains. Temperatures above 110 degrees are not uncommon during summer.

The region is characterized by single-family dwellings, some with large turf landscapes and others with desert landscape; commercial businesses; and resorts. The resort demand alone creates a significant need for water resources. The region has an average population density of around 25 people per square mile. Most of these people are concentrated in the urban towns and cities, not in the outlying desert or the Salton Sea area.

Unlike the Central Valley regions, downstream reuse of landscape runoff and treated wastewater is minimal. Although a large degree of groundwater reuse is associated with the resort golf areas, some of the urban water that is not consumptively used eventually reaches the Salton Sea. Conservation measures can help reduce the irrecoverable losses to this salt sink.

In this region, five urban agencies have signed the Urban MOU.

Special Conditions

Similar to agricultural conservation opportunities, the potential for real water savings to benefit the Bay-Delta depends on the use of the conserved water. For example, conservation savings in Palm Springs may be used to offset future demands. It is unlikely that savings would be transferred to another urban user as a replacement for imported Delta water. Therefore, the values shown for this region may provide little benefit to the Bay-Delta.

URBAN INFORMATION
Colorado River Region

	Population	*Baseline per-capita water use*
1995:	0.5 million	578 gpcd
2020:	1.1 million	522 gpcd (594 if no conservation occurs)
Approximate CII use in 1995:		27% of per-capita use
Estimated CII use in 2020:		28% of per-capita use
Assumed CII reduction as a result of conservation measures:		
	No Action Alternative:	4% (of 2020 projected per-capita water use)
	CALFED:	7%
Assumed residential indoor use (average):		
	2020 baseline	65 gpcd
	2020 No Action Alternative	60 gpcd
	2020 CALFED	55 gpcd
Assumed distribution system losses (as a percent of total urban use):		
	Existing:	12%
	No Action Alternative:	8%
	CALFED:	5%
Assumed ratio of irrecoverable losses to total existing loss:		0.3 (30%) Most urban use is in the Coachella Valley, where much of the deep percolation from golf courses or other losses actually recharge local aquifers.
Assumed existing urban landscape acreage:		35,000 acres
Assumed urban landscaped acreage in 2020:		75,000 acres
Assumed ET_o Value:		6.0 feet of water annually

Estimated Reduction of Irrecoverable Losses for Reallocation to Other Water Supply Uses

About 30% of the conservation potential in the Colorado River Region would constitute a water savings that could be made available to other beneficial uses, including offsetting future urban demands. Such savings also would provide other benefits, namely improved water quality, changed timing of flow releases, reduced fishery impacts, reduced treatment costs, and potentially reduced need for additional water supply development.

Table 5-13a. Assumed Distribution of Landscaped Acreage among ET_o Factors for the Colorado River Region (%)

ET_o FACTOR	1995 ACRES (%)	BASE ACRES (%)	2020 NO ACTION EXISTING ACRES (%)	2020 NO ACTION NEW ACRES (%)	2020 CALFED EXISTING ACRES (%)	2020 CALFED NEW ACRES (%)
1.2	70	70	60	50	50	40
1.0	30	30	35	40	30	30
0.8			5	10	15	25
0.6					5	5
0.4						

Table 5-13b. Potential Conservation of Existing Losses (Including Irrecoverable Loss) for the Colorado River Region (TAF/Year)

USE	PROJECTED REDUCTION UNDER NO ACTION ALTERNATIVE	INCREMENTAL REDUCTION UNDER *CALFED*	TOTAL ESTIMATED REDUCTION
Residential indoor[1]	5-10	5-10	10-20
Urban landscaping[1]	20-25	25-30	45-55
Commercial, industrial, institutional[1]	5-10	10-15	15-25
Distribution system[1]	20-25	15-20	35-45
Total	**50-70**	**55-75**	**105-145**

[1] For this region, it is assumed that 70% of all losses are recovered and available to the local water supply.

Table 5-13c. Potential Conservation of Irrecoverable Losses (Available for Reallocation) for the Colorado River Region (TAF/Year)

USE	PROJECTED REDUCTION UNDER NO ACTION ALTERNATIVE	INCREMENTAL REDUCTION UNDER CALFED	TOTAL ESTIMATED REDUCTION
Residential indoor[1]	0-5	0-5	0-10
Urban landscaping[1,2]	15-20	20-25	35-45
Commercial, industrial, institutional[1]	0-5	0-5	0-10
Distribution system[1]	5-10	5-10	10-20
Total	**20-40**	**25-45**	**45-85**

[1] For this region, it is assumed that 30% of all loss reduction is available for reallocation.
[2] Urban landscaping values include both reduction in losses and changes to landscaping types. See Attachment B for more details on landscape conservation estimates.

5.7 SUMMARY OF ESTIMATED URBAN WATER CONSERVATION POTENTIAL

The following tables summarize the regional conservation estimates for urban regions.

Table 5-14. Estimated Conservation Potential of Projected Losses (Including Irrecoverable Losses) for All Urban Regions (TAF/Year)

REGION[1]	NO ACTION ALTERNATIVE CONSERVATION	INCREMENTAL CALFED CONSERVATION	TOTAL CONSERVATION POTENTIAL
Sacramento River	145-165	85-105	230-270
Eastside San Joaquin River	90-110	95-115	185-225
Tulare Lake	55-75	80-100	135-175
San Francisco Bay	75-90	130-150	205-240
Central Coast	20-40	30-50	50-90
South Coast	410-460	480-520	890-980
Colorado River	50-70	55-75	105-145
Total	**845-1,010**	**955-1,115**	**1,800-2,125**

Other than the irrecoverable portion, which is the only water available for reallocation, these savings provide improved water quality, changed timing of flow releases, reduced fishery impacts, reduced treatment costs, and potentially reduced need for additional water supply development.

[1] Refer to Chapter 3 for information regarding the PSAs that comprise each CALFED region.

Table 5-15. Estimated Conservation Potential of Irrecoverable Loss (a Subset of Total Loss) for All Urban Regions (TAF/Year)

REGION[1]	NO ACTION ALTERNATIVE CONSERVATION	INCREMENTAL CALFED CONSERVATION	TOTAL CONSERVATION POTENTIAL
Sacramento	5-9	4-9	9-18
Eastside San Joaquin River	3-7	6-11	9-18
Tulare Lake	15-30	30-45	45-75
San Francisco Bay	65-80	120-140	185-220
Central Coast	20-40	30-50	50-90
South Coast	340-385	400-445	740-830
Colorado River	20-40	25-45	45-85
Total	**470-590**	**615-745**	**1,085-1,335**

These savings, a subset of the values in Table 5-14, are available for reallocation to other water supply uses.

[1] Refer to Chapter 3 for information regarding the PSAs that comprise each CALFED region.

Although the total potential reduction associated with irrecoverable losses could amount to as much as 1.3 MAF, it must be recognized that amount this would require the majority of urban water users as well as urban water suppliers to implement most all available conservation measures. Achieving this amount will require significant local, state and federal support.

It also should be noted that the additional potential irrecoverable loss reduction resulting from the Water Use Efficiency Program is only slightly more than half of the total shown (745 TAF of 1.3 MAF). This demonstrates CALFED's assumption that existing trends will continue to generate conservation savings at rates greater than quantified by DWR or others. This results from No-Action factors such as the Central Valley Project Improvement Act (CVPIA) that are not fully accounted for in previous estimates of savings achievable under "full implementation" of urban BMPS.

In addition, a significant portion of the irrecoverable loss reduction is in the South Coast Region, which may or may not provide any Bay-Delta benefit. This will depend on how water suppliers in this region reallocate the water saved (Would water savings offset demand growth; reduce Colorado River or other imported, non-Delta supplies; or would they be "left in the Delta"?)

Slightly less than half of the reduction in existing loss estimated in Table 5-14 is composed of recoverable losses and is not available for reallocation for other water supply purposes. However, this significant conservation potential can provide valuable water quality, water management, and ecosystem benefits that are also key objectives of the CALFED Program. In addition, reduced losses may provide in-basin water management benefits and help reduce future demand projections.

5.8 UNIT COST ESTIMATES FOR URBAN WATER USE EFFICIENCY PROGRAMS

The CALFED Water Use Efficiency Program will call on urban water suppliers to fully implement cost-effective Urban MOU Best Management Practices (BMPs). While many urban water suppliers have already made substantial progress towards satisfying the terms of the Urban MOU, others will be just starting out. Meeting CALFED water use efficiency objectives will require substantial conservation program investments in some regions. Determining which investments are cost-effective and which are not will be of key importance. This section presents unit cost ($/AF) estimates for eight different BMP programs. These programs are:

- Residential ULFT Rebate Program
- Residential ULFT Direct Installation Program
- Commercial & Industrial ULFT Rebate Program
- High-Efficiency Washing Machine Rebate Program
- Untargeted Residential Water Survey Program
- Targeted Residential Water Survey Program
- Low Flow Showerhead Distribution Program
- Residential Metering Program

Survey programs for large landscape and commercial/industrial users also were examined. However, the degree of heterogeneity across these programs both in terms of cost and design prevented the development of useful unit cost ranges.

Program unit cost estimates presented in this section are for active conservation (i.e., the cost to increase conservation above what it would be in the absence of intervention by water suppliers). To the degree possible the estimates account for, and therefore do not include, background conservation due to changes in plumbing codes, natural replacement of water using appliances and fixtures, and other factors which are not considered to be part of "active" conservation.

Two types of unit costs are presented: (1) simple unit cost and (2) discounted unit cost. A simple unit cost is defined as the present value of project costs divided by the total yield over the life of the project. A discounted unit cost is defined as the amortized cost of the project divided by its average annual yield. Both estimates are frequently used in project evaluations. Generally, discounted unit costs result in higher estimates than simple unit costs. In both cases a 4.5 percent discount rate is assumed.

These estimates are intended to demonstrate the likely range of cost water suppliers will experience implementing various BMP programs. It is important to emphasize, however, that these **estimates are for informational purposes only**. They are not being used by CALFED for project selection or ranking. Economic feasibility studies for specific projects and programs will occur in later design phases of the Urban Water Use Efficiency Program and during investigations performed by individual water suppliers.

Furthermore, it should be noted that unit costs are only half of the equation when evaluating the merits of a conservation program. Benefits achieved from the measure are the other half. Information on both costs and benefits are essential for appropriate judgments to be made regarding the appropriateness of any particular water conservation program.

5.8.1 Perspective of Unit Cost Analysis

Because the majority of conservation investments will be made at the local level, these estimates are presented from the perspective of an urban water supplier implementing the conservation program. Focusing on the supplier perspective helps to identify which BMP investments are likely to require CALFED cost-sharing assistance and which are not. It is CALFED's belief that in most cases BMPs will be cost effective from a statewide perspective. Those with low unit costs from the supplier's perspective are less likely to require cost-sharing assistance, while those with high unit costs are more likely to require assistance.

5.8.2 Limitations of Unit Cost Estimates

While unit costs can be indicative of cost-effectiveness, they do not directly address the question of economic feasibility. It is always possible that a conservation project with very high unit costs also has very high unit benefits, and vice-versa. Similarly, unit costs are useful for ranking projects only when (1) competing projects are expected to produce exactly the same result or (2) all results can be measured in terms of a single, non- monetary unit (say AF). Neither of these conditions will occur for the majority of water supply, conservation, and recycling projects CALFED may consider. Unit costs are therefore a useful first step to cost-benefit analysis, but they are not a substitute for it.

The estimates presented within this section also do not account for diminishing returns. Showerhead and ULFT distribution programs are both thought to be subject to diminishing returns as device saturation levels increase. For example, consider a 2.5 bathroom house which has a ULFT in the most used bathroom, but not the other two. As additional ULFT's are added, the total savings potential for the dollar investment is not as great as the first toilet replaced. This is because there are less flushes occurring to offset the invested cost. This translates to a higher cost per unit of savings. Conservation experts are starting to notice that unit costs in areas where these programs have been active for long periods are likely to be higher than the unit cost estimates presented in this section.

5.8.3 Data Sources for Unit Cost Estimates

The unit cost estimates shown in Table 5-16 were constructed using methods outlined in the CUWCC's "Guidelines for Preparing Cost-Effectiveness Analyses of Urban Water Conservation Best Management Practices" (Pekelney et al., 1996). Water supplier BMP implementation reports provided most of the program cost data used for these estimates. The cost data account for average expenditures for material, labor, and overhead costs incurred by water suppliers implementing these programs. In some instances it was necessary to supplement this cost data either with cost data from other sources or with engineering estimates. Published conservation program evaluations provided data for expected water savings and savings life expectancy. These studies included but were not limited to:

- THELMA H-Axis Washing Machine Water and Energy Savings Study (THELMA, 1997);
- Oak Ridge National Laboratory's H-Axis Washing Machine Water Savings Study (Oak Ridge, 1998);
- CUWCC's 1997 CII ULFT Savings Study (Whitcomb et al., 1997);
- Metropolitan Water District's 1994 Public Facilities Toilet Retrofits Evaluation (Bamezai et al., 1994);
- Metropolitan Water District's 1994 Ultra Low Flush Toilet Programs Evaluation (Bamezai et al., 1994);
- Metropolitan Water District's 1994 Residential Water Audit Program Evaluation (Bamezai et al., 1994).

Much of this data is compiled in the CUWCC's forthcoming "Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices" (Pekelney et al.).

There is scant data on the extent of program free-ridership, savings decay, and natural replacement rates for these programs. Most of the estimates employ assumptions for these variables. The ranges for program unit costs reflect uncertainty regarding these assumptions as well as variations in program design that affect expected savings and administrative costs. All estimates were rounded to the nearest $100/AF.

TABLE 5-16. Unit Cost Estimates for Various BMP Programs

BMP Program	Simple Unit Cost [4] Estimate ($/AF)	Discounted Unit Cost [5] Estimate ($/AF)
Residential ULFT Rebates	$200 - $400	$300 - $600
Residential ULFT Direct Install	$100 - $300	$300 - $500
CII ULFT Replacement [1]	$200 - $500	$400 - $900
H-Axis Washer Rebates	$400 - $900	$800 - $1700
Home Survey - Untargeted	$700 - $1,000	$1,300 - $1,900
Home Survey - Targeted	$900 - $1,000	$1,700 - $1,900
Residential Metering [2]	$100	$200 - $300
Low Flow Showerhead Distribution	$200 - $300	$300 - $600
Landscape Audits [3]	N/A	N/A
CII Audits [3]	N/A	N/A

[1] Range is based on targeted versus untargeted replacements.
[2] No range for simple unit cost estimates because high and low estimates both rounded to $100.
[3] No estimate provided because of heterogeneity of program designs and costs.
[4] Simple unit cost = P.V. (Costs) ÷ Sum of Yield over Life of Project
[5] Discounted unit cost = Amortized Cost ÷ Average Annual Yield of Project